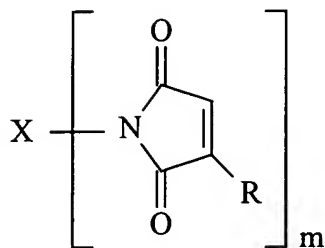
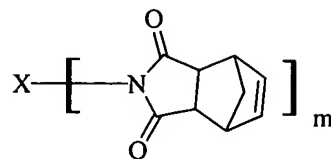


What Is Claimed Is:

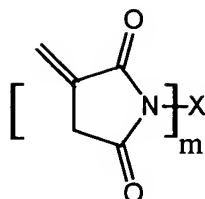
1. A curable composition, comprising:
 - (a) an epoxy or episulfide resin component;
 - (b) a free radical polymerizable component; and
 - (c) a cross linking component, wherein the cross linking component comprises a compound reactive with each of the epoxy resin component and the free radical polymerizable component.
2. The composition of Claim 1, further comprising a free radical initiator for the free radical polymerizable component.
3. The composition of Claim 1, further comprising a curative for the epoxy or episulfide resin component.
4. The composition of Claim 3, wherein the curative comprises a member selected from the group consisting of nitrogen containing compounds, anhydrides, organic acids and Lewis acids.
5. The composition of Claim 4, wherein the organic acid comprises a member selected from the group consisting of phenolics, thiophenolics, thiols or carboxylic acids.
6. The composition of Claim 1, wherein the free radical polymerizable component comprises a maleimide-containing compound, an itaconimide-containing compound, or nadimide-containing compound.
7. The composition of Claim 6, wherein the maleimide-containing compound, itaconimide-containing compound or nadimide-containing compound comprises



(I)



(II)



(III)

wherein:

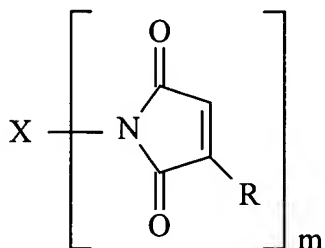
$m = 1-15$,

R is independently selected from hydrogen or lower alkyl, and

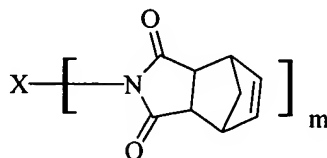
X is a monovalent moiety or a multivalent linking moiety comprising organic or organosiloxane radicals, and combinations thereof.

8. The composition of Claim 1, wherein the maleimide-containing compound or nadimide-containing compound is in the solid state at room temperature.

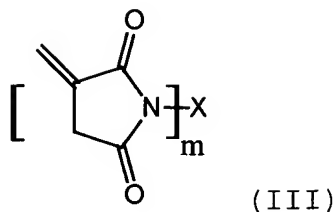
9. The composition of Claim 6, wherein the maleimide-containing compound, itaconimide-containing compound or nadimide-containing compound comprises:



(I)



(II)



wherein:

$m = 1-6,$

R is independently selected from hydrogen or lower alkyl, and

X comprises a monovalent moiety or a multivalent linking moiety selected from

(A) straight or branched chain alkyl, alkylene, oxyalkyl, oxyalkylene, alkenyl, alkenylene, oxyalkenyl, oxyalkenylene, ester, reverse ester, polyester, amide, reverse amide, or polyamide, optionally interrupted or substituted by one or more heteroatoms, such as oxygen, nitrogen and/or sulfur, and optionally functionalized with substituents selected from hydroxy, alkoxy, carboxy, nitrile, cycloalkyl or cycloalkenyl; where the number of carbon atoms in the linking moiety falls between about 12 to about 500;

(B) siloxanes comprising:

$-(CR_2)_m-[Si(R')_2-O]_q-Si(R')_2-(CR_2)_n-$, $-(CR_2)_m-CR-C(O)O-(CR_2)_m-[Si(R')_2-O]_q-Si(R')_2-(CR_2)_n-O(O)C-(CR_2)_n-$, or $-(CR_2)_m-CR-O(O)C-(CR_2)_m-[Si(R')_2-O]_q-Si(R')_2-(CR_2)_n-C(O)O-(CR_2)_n-$,

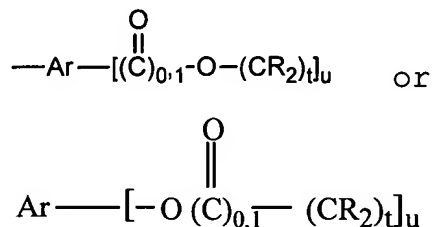
wherein each R is independently defined as above, and each R' is independently selected from hydrogen, lower alkyl or aryl, m' falls in the range of 1 up to 10, n' falls in the range of 1 up to 10, and q' falls in the range of 1 up to 50;

(C) polyalkylene oxides comprising:

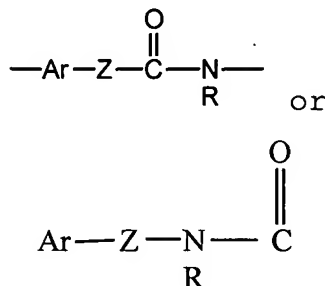
$-[(CR_2)_r-O]_q-(CR_2)_s-$

wherein each R is independently as defined above, r falls in the range of 1 up to 10; s falls in the range of 1 up to 10, and q' is as defined above;

(D) aromatic moieties comprising:

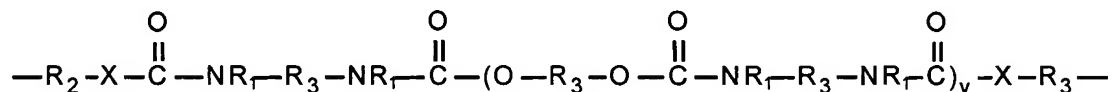


wherein each R is independently as defined above, t falls in the range of 2 up to 10, u is 1, 2 or 3, and Ar is as defined above, or



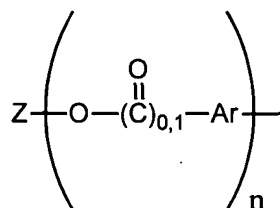
wherein Z is O or NR, where R is hydrogen or lower alkyl;

(E) urethanes comprising:

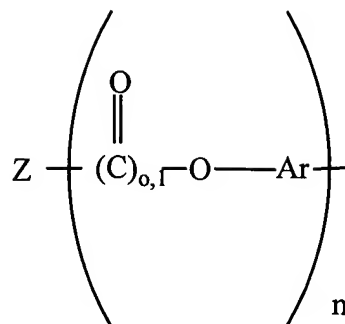


wherein each R₁ is independently hydrogen or lower alkyl; each R₂ independently is an alkyl, aryl, or arylalkyl group having 1 to 18 carbon atoms; R₃ is an alkyl or alkyloxy chain having up to about 100 atoms in the chain, which chain may contain aryl substituents; X is O, S, N, or P; and v is 0 to 50; and

(F) aromatic moieties comprising:

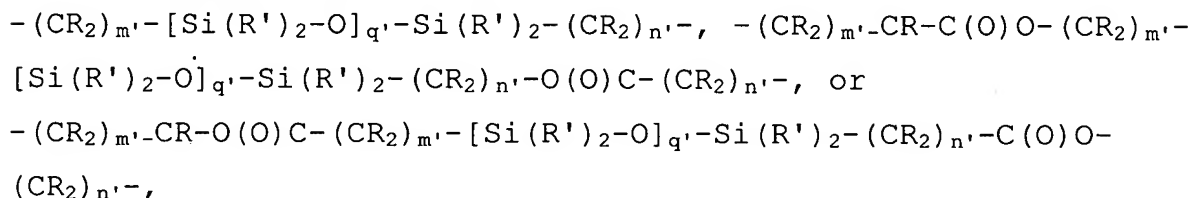


or



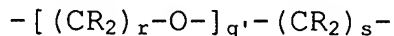
wherein each Ar is a monosubstituted, disubstituted or trisubstituted aromatic or heteroaromatic ring having in the range of 3 up to about 10 carbon atoms; n is 1 up to about 50, and Z is selected from straight or branched chain alkyl, alkylene, oxyalkylene, alkenyl, alkenylene, oxyalkenylene, ester, or polyester, optionally containing substituents selected from hydroxy, alkoxy, carboxy, nitrile, cycloalkyl or cycloalkenyl;

siloxanes comprising:



wherein each R is independently defined as above, and each R' is independently selected from hydrogen, lower alkyl or aryl, m' falls in the range of 1 up to 10, n' falls in the range of 1 up to 10, and q' falls in the range of 1 up to 50;

polyalkylene oxides comprising:

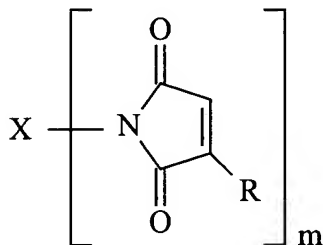


wherein each R is independently as defined above, r falls in the range of 1 up to 10, s falls in the range of 1 up to 10, and q' is as defined above; as well as combinations thereof.

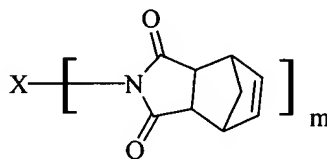
10. The composition of Claim 6, wherein the maleimide-containing compound, the itaconimide-containing

compound, or the nadimide-containing compound comprises a maleimide functional group, itaconimide-containing functional group or a nadimide functional group, respectively, attached to a monovalent radical or polyvalent radical having sufficient length and branching to render the maleimide-containing compound, the itaconimide-containing compound or the nadimide-containing compound, respectively, a liquid.

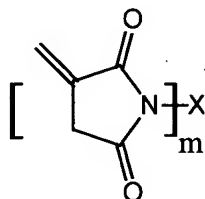
11. The composition of Claim 6, wherein the maleimide-containing compound, the itaconimide-containing compound or the nadimide-containing compound comprises:



(I)



(II)



(III)

wherein:

each R is independently hydrogen or lower alkyl,

-X- comprises a branched chain alkyl, alkylene or alkylene oxide species having sufficient length and branching to render the maleimide-containing compound, the itaconimide-containing compound or the nadimide-containing compound a liquid, and

m is 1, 2 or 3.

12. The composition of Claim 1, wherein the free radical polymerizable component comprises a member selected from the group consisting of (meth)acrylates, maleimides,

itaconimides, nadimides, vinyl ethers, vinyl esters, styrene and derivatives thereof, poly(alkenylene)s, allyl amides, norbornenyls, thiolenes, acrylonitriles and combinations thereof.

13. The composition of Claim 1, further comprising a member selected from the group consisting of one or more of a (meth)acrylate component, a vinyl ether component, a vinyl ester component, a styrene-containing component, a poly(alkenylene) component, an allyl amide component, a norbornenyl component, a thiolene component, an acrylonitrile component and combinations thereof.

14. A curable composition, comprising:

- (a) an epoxy or episulfide resin component;
- (b) a free radical polymerizable component; and
- (c) a cross linking component, wherein the cross linking component comprises a compound functionalized with at least one group reactive with the epoxy or episulfide resin component and at least one group reactive with the free radical polymerizable component.

15. A curable composition, comprising:

- (a) an epoxy or episulfide resin component;
- (b) a free radical polymerizable component; and
- (c) a cross linking component, wherein the cross linking component comprises a compound functionalized with at least one group reactive through an anionic or cationic mechanism with the epoxy or episulfide resin component and at least one group reactive through a free radical mechanism with the free radical polymerizable component.

16. A curable composition, comprising:

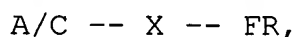
- (a) an anionically or cationically reactive component;

(b) a free radical polymerizable component; and
(c) a cross linking component, wherein the cross linking component comprises a compound having at least one functional group reactive with the anionically or cationically reactive component and at least one functional group reactive with the free radical polymerizable component.

17. The composition of any one of Claims 14-16, wherein the at least one functional group reactive through an anionic or cationic mechanism with the epoxy or episulfide resin component is a member selected from the group consisting of epoxies, episulfides, and combinations thereof.

18. The composition of any one of Claims 14-16, wherein the at least one functional group reactive through a free radical mechanism with the free radical polymerizable component is a member selected from the group consisting of (meth)acrylates, maleimides, itaconimides, nadimides, vinyl ethers, vinyl esters, styrenes, allyl amides, norbornenes and combinations thereof.

19. The composition of Claim 1, wherein the cross linking component comprises a compound having the structure:

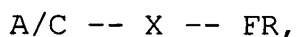


wherein A/C represents at least one anionically or cationically reactive functional group, FR represents at least one free radically reactive functional group, and X represents a spacer.

20. The composition of Claim 1, wherein A/C is E/ES, wherein E/ES represents at least one epoxy or episulfide.

21. The composition of Claim 19, wherein X is as defined in Claim 5.

22. A cross-linking compound comprising



wherein A/C represents at least one anionically or cationically reactive functional group, FR represents at least one free radically reactive functional group, and X represents a spacer, provided that when A/C is not carboxylic acid, FR may be maleimide and/or X may be a five carbon straight chain alkyl group, when FR is not maleimide and X is not a five carbon straight chain alkyl group, A/C may be a carboxylic acid, when A/C is not maleic anhydride, FR is a polybutadiene or when FR is not a polybutadiene, A/C is maleic anhydride.

23. A cross-linking compound comprising

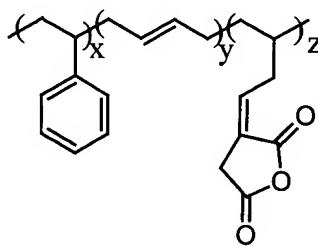
E/ES -- X -- FR,

wherein E/ES represents at least one epoxy or episulfide, FR represents at least one free radically reactive functional group, and X represents a spacer.

24. The composition of Claim 23, wherein X is as defined in Claim 7.

25 The composition of Claim 24, wherein X is as
defined in Claim 7.

26. A cross-linking compound comprising



wherein the mole ratio of $x+y+z=1$.

27. A method of co-curing an epoxy or episulfide resin component with a free radical polymerizable component, the steps of which comprise

providing a curable composition according to Claim 1; and

exposing the composition to conditions favorable to effect cure of the epoxy or episulfide resin component with at least one group reactive therewith of the cross linking component and the free radical polymerizable component with at least one group reactive therewith of the cross linking component.

28. A method for adhesively attaching a chip die to another chip die or a circuit board, said method comprising:

(a) applying the composition of Claim 1 to said chip die,

(b) adjoining said chip die with said another chip die or said circuit board, respectively, to form an assembly wherein said chip die and said another chip die or said circuit board, respectively, are separated by the composition applied in step (a), and

(c) subjecting said assembly formed in step (b) to conditions suitable to cure said composition.

29. The method of Claim 28, wherein conditions suitable to cure said composition include a temperature of less than 200°C for about 0.25 up to 2 minutes.

30. The composition of Claim 1, further comprising a radical cure inducing component.

31. The composition of Claim 30, wherein the radical cure inducing component is a radical heat cure catalyst.

32. The composition of Claim 31, wherein the radical cure inducing component is a radical photocure catalyst.

33. The composition of Claim 31, wherein the radical heat cure catalyst is a member selected from the group consisting of peroxides, azo compounds, and combinations thereof.

34. The composition of Claim 1, further comprising a filler.

35. The composition of Claim 34, wherein the filler is conductive.

36. The composition of Claim 34, wherein the filler is thermally conductive.

37. The composition of Claim 34, wherein the filler is electrically conductive.

38. The composition of Claim 34, wherein the filler is non-conductive.

39. An article of manufacture comprising a semiconductor chip attached to and in electrical interconnection with either another semiconductor chip or a carrier substrate, the semiconductor chip having a first surface and a second surface, with the first surface having electrical contacts arranged in a predetermined pattern thereon for providing electrical engagement with the another semiconductor chip or the carrier substrate, respectively, and with the second surface having a cured composition of Claim 1 disposed on a layer or a portion thereof, so as to provide attachment between the semiconductor chip and the another semiconductor chip or the carrier substrate, respectively.